

MEMORANDUM

DATE: September 23, 2019

TO: Brett Packer, Essential Oil Research Farm, Ashley Peck, Holland & Hart,

RE: Highland Flats Wetland Mitigation Late Season Monitoring

FROM: Leslie Gecy, EcoWest Consulting, Inc.

INTRODUCTION

EcoWest visited the Highland Flats Tree Farm (HF) wetland mitigation site from September 6 and 9, 2019 to conduct the final 2019 growing season monitoring. The data collected during this monitoring represent the official 2019 results against which the 2019 success criteria will be evaluated.

For 2019, the Detailed Mitigation Plan (Plan) identified the following three success criteria, some of which changed from the 2018 criteria. As per the Plan:

- The woody plant criteria for all mitigation areas changed from survival to density with the specific density targets based on the habitat (i.e., target density of from 765 to 1,742 woody stems/acre, for forested and scrub-shrub habitats, respectively, except for the Culvert which had a different target of 465 woody stems/acre as it reflected supplemental planting within an existing canopy).
- The maximum allowable non-native, invasive cover criteria remained at less than 10% in the HW area, but increased to 25% in the Culvert and Reservoir areas.
- Native cover requirements were variable among the mitigation areas, ranging from 40% herbaceous cover at the Reservoir to exhibiting a positive trend towards meeting the final Yr 5 cover goals in the HW area.

Bird's-foot trefoil (*Lotus corniculatus*) and white clover (*Trifolium repens*) have been used to control erosion and provide a nitrogen-producing cover crop in the Highland Flats farm fields. This trefoil-clover mix has spread from the fields and hillslopes into the HW and Reservoir mitigation areas. As identified in a September 5, 2017 monitoring memorandum, "For the purposes of this project, the trefoil-clover erosion control mix is classified as an early seral, allowable ground cover that is providing beneficial soil stabilization and one that will not persist over the long term (i.e., non-native, but not non-native invasive)."

Further discussions with the EPA in August 2019 clarified how the species should be addressed in evaluating native cover in the HW area. For the HW area, the trefoil-clover mix will continue to be treated as an allowable and desired ground cover. It will also be considered part of the

weed treatment plan to minimize reed canary grass (RCG) re-establishment through non-herbicidal approaches. The benefits of the trefoil-clover mix include:

- Providing a dense cover to help prevent RCG establishment,
- Providing a source of on-site nutrients that can help the desired trees and shrubs establish without stimulating excessive weed growth, and
- Helping to maintain an appropriate soil temperature.

As such, the mix meets the immediate need to minimize the cover of non-native invasive species and to allow the desired trees and shrubs to grow. In lieu of a set cover requirement, where the trefoil-clover mix is functioning adequately as a RCG treatment, the native plant cover requirement will be waived for 2019 and 2020, as long as the following occurs:

- Native shrub and tree cover increases,
- The trefoil-clover mix is kept away from the bases of the desired trees and shrubs, and
- RCG and associated species, such as creeping foxtail and tansy, remain at bay.

The preliminary monitoring results and any necessary remedial actions are discussed below by mitigation area.

CULVERT ENHANCEMENT AREA

Total native cover in the Culvert area was 83.9%, well above the Year 5 success criterion of at least 50% cover from plants rooted in the mitigation area. Density was similar to that of 2018, again exceeding the success criterion. Some RCG re-established near the culvert outlet, but overall it provided less than 0.5% cover. Absent a major adverse event, there are no concerns regarding the ability of the Culvert area to meet the Year 5 success criteria as they have already been met and likely will continue to be.

RESERVOIR MITIGATION AREA

The woody plant density in the scrub-shrub habitat remained high and continued to well exceed the density success criterion. Non-native invasive cover was low, with 1% cover RCG. However, native emergent marsh cover at or below the OHW remained at 34%, below the Year 3 success criterion of 40% and unlikely to meet the final criterion of 80% by Year 5.¹ The lower than originally anticipated cover reflected a water management change to full pool maintenance with water losses only due to evapotranspiration or for fire suppression, in the unlikely event a fire occurs. The new water management regime, combined with goose herbivory, resulted in a loss of deep marsh vegetation.

¹ It should be noted that overall native cover was quite high in much of the PSS/SEM portion of the mitigation area, with shrub cover of 80% at the OHW line. However, the herbaceous cover below OHW was more patchy than desired. The loss of deep marsh cover also dramatically affected the total herbaceous cover values.

The proposed remedial plan was to expand the existing naturally-establishing alder scrub-shrub/forested habitat around additional portions of the reservoir shoreline in lieu of replanting the deep marsh. This plan was summarized in an August 26, 2019 memorandum and agreed to in an August 27, 2019 phone conversation between Leslie Gecy (EcoWest) and Yvonne Valette (EPA). Planting locations were flagged in the field within the selected expansion area during the September site visit. The planting will include 100 alder and 25 red cedar. The alder planting is primarily concentrated between the OHW and an elevation approximately two feet above it, which is the elevational range within which the existing alder has established. Some alder were flagged for planting at a slightly higher elevation as alders within the Reservoir Reference area occurred at elevations up to 2.5 feet above OHW. The cedar planting locations were flagged at slightly higher elevations along seep lines and in general correspondence with the topographic positions they occupy in the Reference area.

The planting is planned for Fall 2019, as long as locally-adapted stock is available. It is possible that insufficient local alder ecotypes may not be available until early spring 2020, but all attempts will be made to obtain and plant acceptable stock in October-November 2019.

HW RESTORATION AREA

The shrub cover increased to 11.8 - 23.6% in much of the area.² The mesic riparian cover remained lower at 5.3%, which was not surprising as the primary plants (snowberry and meadowsweet) are naturally slower growing than some of the other species.

The vigor in all areas was generally quite high. However, there was some loss of planted shrubs, particularly meadowsweet and coyote willow. Because of both planting of the extra bundle plants and the abundance of volunteers (mostly cottonwood, but also Bebb's willow, meadowsweet and snowberry), the density criteria were well met in the Mesic Riparian, PFO/PSS and Channel SS habitats (densities of from 1,413 to 4,933 woody stems/acre, exceeding the required 765 to 1,742 woody stems/acre).

Overall native plant cover ranged from 23.7% to 34.0%. The trefoil-lotus cover increased over that of 2018, particularly in the FO/SS habitat where it increased from 30.0% in 2018 to 53.8% in 2019. As noted above, this represents an allowable cover that will be shaded out over time.

Non-native invasive cover ranged from 0.1 to 2.2% depending on the habitat, but with a few larger patches of RCG and creeping foxtail. In portions of HW-2, white sweet clover became a nuisance, providing up to 2% cover within the monitoring plots (but generally higher aerial cover throughout the 2017-graded portion of HW-2).

All success criteria, as revised, were met.

Two items worth noting were that:

² This includes both tree and shrub species as no woody plants have reached the required 1" dbh to be classified as in the tree layer, in spite of some very tall cottonwoods.

(1) The planted cottonwoods, Bebb's willow and meadowsweet exhibited higher cover where a combination of exclosure (and resultant lack of cages) and shade occurred in contrast to more open areas outside of exclosures.

(2) Young Living recently acquired two former nursery properties on which some native stock was present. This stock was slated to be removed and replaced with trees suitable for essential oil production. ECW reviewed the properties and identified a number of medium to large size native wetland/riparian species in the nursery fields (i.e., native trees grown as nursery stock and not trees occurring within wetland or riparian habitats).

To increase native cover and assist in shading out both non-native invasive species and the trefoil-clover mix over time, the HF staff elected to implement two activities in Fall 2019:

- Expand the exclosures to encompass all of the non-graded portions of HW-3a, with the exception of pathways left open for ungulate access to and from the stream channel and the adjacent reference wetland. Once enclosed and the woody plants enter dormancy, the anti-herbivory cages are to be removed.
- Transplant some larger native trees slated to be otherwise removed from nursery fields to provide shade and additional native cover in selected locations. The selected locations were either in areas of either lower or more patchy woody plant cover or where additional shade would be helpful in promoting meadowsweet and other species growth. Species to be transplanted include cottonwood, aspen, lodgepole pine, and ponderosa pine. Two larger Bebb's willow will be purchased and placed in the stream channel where the coyote willow has struggled but the pre-existing Bebb's willow has exhibited good vigor.

These trees/shrubs range in size from 5-6 feet to 12 feet tall (larger for the aspen) and will be able to provide greater cover in the short term than the previously planted bareroot stock. The previously planted lodgepole and ponderosa pines have survived with high vigor, but as of yet, provide insufficient shade to help promote moisture retention and shrub growth.

Most of the plants will be placed using a tree spade stationed on the access road. The willows and cottonwoods are smaller and will be placed in hand-dug holes.

Measures to be implemented in 2020 to also improve shrub growth and minimize additional shrub loss will include earlier and more continual planting basin clearing to minimize trefoil-lotus competition with the desired woody plants, increased attention to and removal of sweet clover (also to be implemented September 2019), and earlier removal of any RCG to minimize potential native plant trampling associated with the much more difficult late season, dry soil RCG removal. HF staff are also considering developing a larger RCG buffer via solarization in addition to RCG seed head removal within the adjacent bordering Reference area.